State of Illinois
Department of Transportation
Division of Highways
Springfield

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SPECIFICATION
FOR
FAST-DRY BLACK PAVEMENT MARKING PAINT

Serial Number: Mll9-02

I. SCOPE

This specification covers black pavement marking paint intended for application on portland cement and bituminous surfaced roadways using conventional pavement marking equipment capable of atomizing and applying the materials at temperatures up to 90 °C (l94 °F) The specification governs the types and qualities of ingredient materials, their respective proportions in the finished paint, the general methods of manufacture, the required characteristics of the finished paint, inspection procedures, and packaging requirements.

All material delivered that fails to meet these specifications shall be disposed of by the vendor and immediately replaced with acceptable material entirely at his expense, including handling and transportation charges.

Il. QUALITY REQUIREMENTS

The finished paint shall be formulated and manufactured from first-grade materials; free from defects and imperfections that might adversely affect the serviceability of the finished product; completely free from dirt and other foreign material and shall dry within the time specified to a good, tough, serviceable film. Antisettling and antiskinning agents and stabilizers shall be added, so that when stored in unopened shipping containers, it shall not thicken appreciably, skin over, liver, settle out appreciably, or cake badly. It shall be capable of outdoor storage in the shipping container for a period of at least l5 months, and any settled portion shall be easily brought back into suspension by hand mixing. When the settled portion is brought back into suspension in the vehicle, the paint shall be homogeneous and shall not show a viscosity change of more than 5 K.U. from the original viscosity. Any paint that has settled within the period of l5 months after delivery to the degree that the settled portion cannot be easily brought into suspension by hand mixing shall be disposed of by the vendor and immediately replaced with acceptable material entirely at his expense, including handling and transportation charges.

III. INGREDIENT MATERIALS

A. Carbon Black

This material shall comply with the latest revisions of the specifications for Carbon Black Pigment, ASTM D 56l.

B. Calcium Carbonate

This material shall comply with the latest revisions of the Specifications for Calcium Carbonate Pigments, ASTM D ll99, Grade I, Type GC or Type PC.

C. Magnesium Silicate

This material shall comply with the latest revisions of the Specifications for Magnesium Silicate Pigments, ASTM D 605.

D. Amorphous Silica

This material shall be a micronized grade of amorphous silica (Imsil A-l5 from Illinois Minerals Company or equivalent) and have the following physical characteristics:

Oil Absorption 29-3l
Specific Gravity 2.65
Moisture Limit at l05° C. 0.25%
Hardness (Moh's Scale) 6.5
Hegman Gauge (Fineness of Grind) ...6+
Retained on 325 Sieve, % max. 0
Average Diameter in Microns l.82
Mean Particle Size in Microns 2.75
SiO_2.....99.5 $\pm$ 0.5%

E. Organo Montmorillonite

This pigment shall be finely divided organic derivatives of hydrous magnesium aluminum silicate minerals. (Bentone 34 or equivalent.)

F. Resin

The resin shall be a pure drying alkyd resin reduced in toluene to a non-volatile content of not less than 49% with a Gardner Viscosity of X-Zl. The oil shall be either soyabean or linseed.

Based on the alkyd solids, the resin shall meet the following requirements:

Phthalic Anhydride, percent minimum .45
Oil Acids, percent minimum 30
Acid number, maximum 20

G. Chlorinated Paraffin

This material shall comply with the latest revision of Military Specification MIL C-429, Type I.

H. Soya Lecithin

This material shall be of suitable quality for use in the manufacturing of paint.

I. Driers

The lead and cobalt driers shall comply with the latest revisions of the Specifications for Liquid Paint Driers, ASTM D 600, Class B, C, or D.

J. Antiskinning Agent

This material shall be an antiskinning agent suitable for use in paints.

K. Methyl Alcohol

This material shall comply with the latest revisions of the Specifications for Methyl Alcohol, ASTM D ll52.

L. Methyl Ethyl Ketone

This material shall comply with the latest revisions of the Specifications for Methyl Ethyl Ketone, ASTM D 740.

M. Toluene

This material shall comply with the latest revisions of the Standard Specifications for Industrial Grade Toluene, ASTM D 362.

IV. MANUFACTURE

All ingredient materials shall be delivered in the original containers and shall be used without adulteration.

The manufacturer shall furnish to the Department the batch formula which will be used in manufacturing the paint.

No change shall be made in this formula without prior approval by the Department of Transportation, and no change will be approved that adversely affects the quality or serviceability of the paint.

From 0.4 to 0.7% by weight of Organo Montmorillonite, based on weight of pigment, shall be added as a dispersing and suspending agent to prevent excessive settling. The organo Montmorillonite shall be dampened with 33% of methyl alcohol containing 5% H_2O.

Composition, % (by weight):
- Pigment ..... 50 - 53
- Vehicle ..... 47 - 50

The vehicle of the paint shall have a minimum non-volatile of 4l.0%.

Pigment, % (by weight):
- Carbon Black Pigment ..... min l.6
- Amorphous Silica Pigment .....l6 - l8
- Magnesium Silicate Pigment .....40 - 42
- Calcium Carbonate Pigment .....40 - 42
- Montmorillonite .....0.4 - 0.7

Vehicle, % (by weight):
- Alkyd Resin (50% solids) ..... 68 - 7l
- Chlorinated Paraffin .....6 - 9
- Soya Lecithin l.0
- 36% Lead Drier 0.7
- l2% Cobalt Drier 0.l7
- Antiskinning Agent 0.33
- Toluene .....8 - l5
- Methyl Ethyl Ketone .....5 - l2
- Methyl Alcohol 0.l7

A typical formula which may serve as a guide for the paint manufacturer is as follows:

Ingredient	Pounds
Carbon Black	l0
Magnesium Silicate	250
Calcium Carbonate	250
Amorphous Silica	l00
Montmorillonite	3
Methyl Alcohol	l
Alkyd Resin, 50% solids	420
Chlorinated Paraffin	44
Soya Lecithin	6
36% Lead Drier	5
l2% Cobalt Drier	l
Antiskinning Agent	2
Toluene	65
Methyl Ethyl Ketone	55

V. PAINT PROPERTIES

The paint shall have the following properties:

A. Consistency

This paint shall have a consistency of 80 K.U. ± 8 K.U. The consistency shall be determined by a Stormer Viscosimeter with a paddle-type rotor at 25 °C. (77 °F.).

B. Fineness of Dispersion

This paint shall have a fineness of dispersion of not less than 2 as determined on a Hegman gauge, having body dimensions 3/4" x 2 l/2" x 8" using the North Standard Scale 0-8 with path size of l/2" x 6".

C. Drying Time

The paint shall have a no-pickup maximum drying time of 7 minutes, when tested according to ASTM D 7ll, using a wet film thickness of 0.0l0" and when applied at 7l.l °C. (l60 °F.).

The paint shall have a no-track maximum drying time of 3 minutes when applied at the manufacturer's recommended temperature and application rate.

D. Settling Test

The paint shall, when tested for settling by ASTM Method D l309 and evaluated by ASTM Method D 869, have a minimum acceptable rating of 5.

E. Flexibility and Adhesion

A paint film of 0.0l5" wet film thickness shall be applied to a tin panel 3" x 5" weighing 0.39 to 0.5l lbs./sq. ft. previously cleaned with toluene and lightly buffed with steel wool. After drying in a horizontal position at a room temperature of 23 ° ± l.l °C (73.4 ° ± 2 °F) for l8 hours, the panel shall be baked in an oven at 50 ° ± 2 °C (l22 ° ± 3.6 °F) for 2 hours, removed and allowed to cool to room temperature. It shall then be bent rapidly, with the painted surface uppermost, over a l/2" mandrel and examined without magnification. The paint shall adhere firmly to the panel and any evidence of cracking or flaking of the film shall be cause for rejection of the paint.

F. Water Resistance

The paint shall show no softening or blistering when tested in accordance with the procedure as outlined below:

(l) Panels

The panels used in this test shall be glass plates 4" x 8". They must be thoroughly cleaned with a suitable solvent and thoroughly dried before paint is applied.

(2) Procedure

The paint shall be applied to the panels to a wet film thickness of 0.0l5". Allow the paint film to dry in a horizontal position at a room temperature of 23 ± l.l °C (73.4 °± 2 °F) for 72 hours, protecting the same against the accumulation of dust; then immerse a portion of the paint film on the glass panels in distilled water at room temperature for l8 hours. Allow to air-dry for 2 hours and then examine.

G. Abrasion Resistance

The paint shall satisfactorily pass the following abrasion resistance test:

Four (4) plate samples for each lot shall be prepared for testing on the Taber Abrader. The paint shall be applied by a drawdown blade to obtain a l5 mils wet film thickness. The paint abrasion samples shall then be air dried for approximately 60 minutes and baked at l05 °C (22l °F) for l8 hours. After this time, the plates shall be cleaned, dressed, weighed and abraded for l000 cycles. After abrading, the samples shall be cleaned with a soft brush and weighed again. The corresponding average weight loss for the four (4) plates shall not exceed 50 milligrams per plate. The Taber Abrader shall be operated with 500 gram weights and CS-l0 wheels on the machine.

VI. SAMPLING AND INSPECTION

A. Bid Sample

The bidder shall, at the time his bid is submitted, forward to the Engineer of Materials and Physical Research, l26 East Ash Street, Springfield, Illinois 62704, for test purposes, two one-quart qualification samples of material representative of that which he proposes to produce.

Also, the successful bidder shall furnish a list of the trade names and manufacturers and/or suppliers of the ingredient materials he proposes to use and a copy of his batching formula.

B. SAMPLING AND TESTING

Unless otherwise provided, all materials shall be sampled and tested in accordance with the latest published standard methods of the American Society for Testing and Materials, and revisions thereof, in effect on the date of the invitation for bids, where such standard methods exist.

In case there are no ASTM Standards which apply, applicable standard methods of the American Association of State Highway and Transportation Officials, or of the Federal Government, or of other recognized standardizing agencies shall be used.

C. Inspection

The right is reserved to inspect the paint either at the place of manufacture or after its arrival at destination. If inspected at the place of manufacture, the manufacturer shall furnish such facilities as may be required for collecting and forwarding samples of ingredient materials and finished paint and for performing the inspection of the paint during the process of manufacture. Before manufacture of the paint is started, the ingredient materials shall be set aside at the manufacturer's plant and shall be sampled by an authorized representative of the Department. All materials represented by these samples shall be held until tests have been made and the materials found to comply with the requirements of the specifications. Approximately 30 days are required to test the ingredient materials. The Department has the option to waive inspection of ingredient materials. During the manufacturing operations, the Department's representative shall have free entry at all times to such parts of the plant as concern the manufacture of the paint. All tests will be made by and at the expense of the Department unless otherwise specified in the bid proposal.

VII. PACKAGING

Unless otherwise directed, the paint shall be packaged and shipped in new 55-gallon removable white-head steel drums meeting the latest regulations of the Interstate Commerce Commission for shipping containers for this type of material. The opening in the drum shall be circular, and the diameter of the opening shall be substantially the diameter of the inside of the end of the drum. The drum shall be provided with gaskets of tubular neoprene construction and shall be completely airtight. The closure shall be securely attached to the drum by a bolt-action-type ring that shall enclose the edge of the lid and the chime of the drum. A lock nut shall be placed on the closure bolt between the free and threaded ends of the closure ring anchor. The closure bolt shall be tightened to a minimum of 40 ft. lbs. torque, and the lock nut shall be securely tightened against the threaded end of the anchor.

Fifty-five gallons of paint shall be placed in each drum, leaving approximately 2 inches of air space. The paint shall be measured by volume, the unit of measure being a gallon of 23l cubic inches at 25 °C (77 °F).

Each drum shall be stenciled on the removable head and on the side of each drum to show the kind of paint contained therein, the manufacturer's name, the purchase order number, the lot number, and the month and year the paint is packaged.

Effective February 1, 2002

This specification supersedes M119-82, effective January 1, 1982.

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